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Further Notes on Halictine Bees (Hymenoptera: Apoidea) Visiting *Isomeris arborea* in Southern California

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In a brief earlier report (Linsley, 1986) records of three species of small halictine bees visiting *Isomeris arboreus* at Desert Hot Springs, California, on December 25, 1985, were provided. In early February 1987, further samples from the same site revealed some interesting comparisons with the earlier collections.

Isomeris arboreus is a member of the Caparidaceae (caper family) and is most commonly known as "bladder-pod" because of the elongate, inflated seed pods. It is particularly abundant along the western edge of the California deserts but occurs elsewhere including southern California sea cliffs. In the desert it is said to bloom whenever it rains. The plant is a densely branched shrub, growing mostly four to five feet tall when mature. When in bloom the numerous flowers with their four yellow petals make the plant conspicuous from a distance. The four stamens and the pistil are equal in length (see photograph). The thread-like staminal filaments cannot support honeybees, which visit the flowers primarily for nectar, but easily sustain the small halictines. These bees land directly on the anthers and frequently crawl from anther to anther by reaching out with the forelegs. Nectar is obtained from the base of the flower. The significance of this plant in the present study is that, as a perennial, it is one of the first plants to bloom in the desert and thus able to provide forage for these early emerging polylectic bees.

Moldenke and Neff (1974) list seven species of small halictines taking nectar from *Isomeris*. In addition to those referred to below, they recorded *Lasioglossum sisymbrii* (Cockerell) (3♀), *L. trizonatum* (3♀), and *Evylaeus argemonis* (Cockerell) (2♀), and *Dialictus microlepoides* (Ellis) (3♀), each from Riverside County, California; and *Dialictus hyalinus* (Crawford) from Los Angeles County. They also list a female of *Augochlorella pomoniella* (Cockerell) taking nectar at this plant in San Diego County. Moure and Hurd (1977) include these records in their tabulations, adding only one more halictine, *Agapostemon mexicanum* from Baja California and Sonora.

Between February 2 and 9, 1987, eight samples of bees were taken from plants at the exact site that was utilized in the December 1985 collections. This area is in an old wash bordered on the west side by a high embankment, and is subject to strong winds which may temporarily remove the bees from the plants or complicate their flight patterns. However, the bees persist in collecting pollen, even in the face of winds which, when gusting, made it difficult for me to control the net. The site was bordered by pavement laid out for future development and the plants were concentrated near the edge of the paved areas, but were also scattered on the land nearby. The surface soil was composed of coarse sand and gravel with a few large

boulders—an unpromising area for ground nesting bees. In fact a casual search revealed no sign of nesting nearby.

The small sample (12 specimens) taken in December contained six females of *Dialictus microlepoides* (Ellis) and one female of *Evylaeus amicus* (Cockerell) which were gathering pollen and five females of *Evyaeus pulveris* (Cockerell)[1] which were taking only nectar. However, species abundance in the early February samples was reversed. The 248 females of *E. pulveris* collected were all gathering pollen, but the two females each of *Dialictus microlepoides* and *Evylaeus amicus* were taking only nectar, as were one each of *Dialictus albohirtus* (Crawford) and *D. hyalinus* (Crawford) (all kindly identified by George C. Eickwort). Earlier, Moldenke and Neff (1974) had recorded 18 females of *Evylaeus ruficornis* (Crawford) (det. Timberlake) taking nectar from *Isomeris* in Riverside County, California, but did not give the dates of capture[1]. Our 1987 collections and associated data (temperatures averaged for each period) were as follows:

Evylaeus pulveris
Feb. 2, 23♀P (1230–1300, broken sky, variable wind, temp. 24°C)
Feb. 3, 11♀P (1830–0900, overcast, windy, temp. 20°C)
Feb. 5, 19♀P (0830–0900, overcast, variable wind, temp. 19°C)
Feb. 6, 95♀P (0930–1030, clear, no wind, temp. 27°C)
Feb. 7, 19♀P (0630–0700, overcast, no wind, temp. 18°C)
Feb. 8, 27♀P (1015–1030, overcast, no wind, temp. 20°C)
Feb. 8, 8♀P (1500–1515, broken sky, no wind, temp. 27°C)
Feb. 9, 26♀P (1015–1030, broken sky, no wind, few rain drops, temp. 20°C)
Evylaeus amicus
Feb. 2, 1♀N (as above)
Feb. 8, 1♀N (as above)
Dialictus albohirtus
Feb. 6, 1♀N (as above)
Dialictus hyalinus
Feb. 2, 1♀N (as above)
Dialictus microlepoides
Feb. 2, 1♀N (as above)
Feb. 7, 1♀N (as above)

Bees of the genus *Evylaeus* are eusocial although they differ in levels of sociality (Packer and Knerer, 1985; Eickwort, 1986). In those species which have been studied, fertilized females overwinter to initiate the populations of the following year (usually two generations). Thus the data recorded here and previously are based upon early emergence of overwintering females and the absence of males is to be expected.

Most previous records for the species listed above are to be found in Moldenke and Neff (1974). They list 214 females of *Evylaeus amicus* from 33 flowering plants

[1]Ronald McGinley (in litt.) has indicated that there are unresolved problems with the identity of this species. Both he and George Eickwort suggest that the Moldenke and Neff (1974) records under the name *E. ruficornis* also apply here. However, for the sake of consistency and future reference we have continued to use the name "*pulveris*" until the matter is cleared up.

Upper: wind-blown plants of *Isomeris* at Desert Hot Springs in foreground; Mt. San Gorgonio in background (Photographs by J. M. Linsley). Lower: Female *Evylaeus pulveris* taking pollen from *Isomeris* flowers (Photograph by Kim Hoelmer).

(including *Isomeris arborea*) but taking pollen only from *Adenostoma, Ceanothus* and *Clarkia,* and record the flight period as from February 21 to May 11. No males were reported. The name "*Evylaeus pulveris*" does not appear in their listings, nor does that of *Dialictus albohirtus*. For *Dialictus hyalinus,* they include an extensive list of flowers visited for nectar by males and/or females during a flight period extending from February 18 to November 13. Although they do not give dates with the individual records, presumably the males were taken during the latter part of the flight period. The same is true for *Dialictus microlepoides,* although among the nectar plants they include *Isomeris arboreus.*

From our data at this site, there is no indication as to the number of generations involved in the annual cycle of *Evylaeus pulveris,* but the females that are active in December must represent the overwintering generation newly emerged and not yet collecting pollen. They became extremely active by early February. A visit to the area in early June, 1987, revealed that the plants were no longer in bloom, and no sign of the halictines or honey bees was evident on any other flowers in the area. Unfortunately, the precise site of our collections was being bulldozed for housing construction and will be unavailable for further study. (This calamity has overtaken us in numerous desert localities in the Southwest!)

With regard to these same species we have taken males previously in Arizona and published records are also available for some:

Evylaeus amicus have been collected by us in large numbers at flowers of *Cercidium microphyllum* at Gila Bend, Arizona, on May 11, 1978, where they were present throughout the day. The females, as expected, are polylectic and we have found them taking pollen from *Larrea divaricata, Cercidium microphyllum,* and *Parkinsonia aculeata* in Arizona and southern California deserts.

We have captured males of *E. pulveris* (identified by Timberlake) at flowers of *Cercidium microphyllum* in the Arizona desert, once at Gila Bend and once near the Colorado River in Yuma County--both collections in mid-May.

Aldred (1969) reported the capture of 33 males and three females of *Dialictus albohirtus* at the Nevada Test Site. He lists a variety of herbaceous plants and shrubs from which collections were made in June (mostly) and July, but does not provide data as to sexes associated with individual plants. He states that the most common host was *Asclepias erosa.* This is a good nectar plant but, of course, not a source of pollen for bees.

In earlier collections by us, a male of *Dialictus hyalinus* was taken with a few pollen- and nectar-gathering females at flowers of *Cercidium microphyllum* at Gila Bend, Arizona, on May 11, 1978. Four other males were captured at *Tamarix aralensis* at Keeler, Inyo County, California, on June 15. Our earliest capture of a male in Arizona was on May 12, 1978. Pollen-gathering females were found at *Larrea tridentata* in Arizona and southern California in March and April.

Dialictus microlepoides is a widespread common polylectic species, especially in the southwestern deserts and northwestern Mexico. Aldred listed males and females from the Nevada Test Site in June (mostly) and July, most commonly at *Viguieria multiflora.* We have captured males with females taking pollen in Oro Valley, Pima County, Arizona, on May 28, 1976, from *Cercidium microphyllum,* and large numbers of males (41) along with pollen- and nectar-seeking females at the same host, on May 21, 1978. At Palm Springs, California, only females taking pollen were present at flowers of *Larrea tridentata* on July 6, 1975.

It is regretted that circumstances beyond our control prevent further attempts to clarify the seasonal pattern of activity of these bees in the vicinity of Desert Hot Springs, but we provide these limited data in the hope that future studies may clarify their occurrence in the western Colorado Desert during the summer, fall and early winter.

Acknowledgments

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